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MPhil and PhD Students Symposium
Institute of Transport and Logistics Studies
The University of Sydney
14-15 June 2011

PROGRAM

Day 1: Tuesday, June 14, 2011

09:00-10:30	**Session 1 Chair: Waiyan Leong**
1	*Transport purpose and modes detection based on GPS survey data* Li Shen
2	*Intra-household interaction in travel mode choice: effects of contextual and situational factors* Chinh Q. Ho
3	*Linking choice model to the diffusion of electric vehicle in Australia* Asif Ahmed
10:30-11:00	**Tea**
11:00-12:30	**Session 2 Chair: Yujie Cai**
4	*Embedding multiple heuristics into choice models: an exploratory analysis* Waiyan Leong
5	*Understanding the dynamics of travel behaviour changes from pseudo panels: evidence from Sydney Household Travel Survey data* Chi-Hong (Patrick) Tsai
6	*Reducing freight transport emissions: a review of mitigation policies* Richard Ellison
12:30-13:30	**Lunch**
13:30-15:00	**Session 3 Chair: Chi-Hong (Patrick) Tsai**
7	*Domination aspects in supply chains* Elizabeth Barber
8	*Supply chain disruption costs study in containerized maritime transport chain* Zeyan Zhang
9	*What have been brought to the negotiation table? First glance at the stated choice experiment data* Demi Chung
15:00-15:30	**Tea**
15:30-17:00	**Session 4 Chair: Elizabeth Barber**
10	*Direct modelling of attribute attendance* Andrew Collins
11	*Consistently inconsistent: the role of certainty, acceptability and scale in automobile choice* Matthew J. Beck
12	*Valuing travel time variability within the attribute-specific extended expected utility theory model and rank-dependent utility theory model* Zheng Li

Day 2: Wednesday, June 15, 2011

08:30-10:00	**Session 5** **Chair: Li Shen**
13	*A real-time decision making policy for container vessel slot allocation in global empty container repositioning* Montathip Chanpum
14	*Management of supply chain networks for diverse market requirements* Yujie Cai
15	*Improving road safety: an analysis of drivers' personal characteristics and objective driver behaviour* Adrian B. Ellison
10:00-10:30	**Tea**
10:30-11:30	**Session 6** **Chair: Montathip Chanpum**
16	*How do businesses react to removal of car parking? -Insight from focus groups of local government staff* Claudine Moutou
17	*Hypothetical bias in stated choice experiments: is it a problem? And if so, how do we deal with it?* Simon Fifer
11:30-12:00	**Open Discussion** **Chair: Jyotirmoyee Bhattacharjya**
12:00-13:00	**Lunch**

ABSTRACTS

1. Transport purpose and modes detection based on GPS survey data

Li Shen

Supervisor: Peter Stopher
Associate supervisor: Stephen Greaves

In the past, travel diaries have typically been used to record travel data. As GPS surveys have been introduced within the last ten years to support or even replace the diary survey to report people's travel information, how the transport purpose and modes are determined via GPS data has become a significant challenge. With the development of artificial intelligence (AI) technology, it is possible to introduce AI into the transport area to assist transport planning. I will firstly adopt Fuzzy Neural Networks (FNN), one of the AI techniques, for the detection of trip purpose and modes. After developing/adjusting the FNN, I will undertake a comparison of FNN and other methodologies that are used to detect transport purpose and modes by assessing the effects of these methodologies on transport models. A case study will also be conducted to demonstrate the "best" methodology to detect transport purpose and modes based on GPS records.

2. Intra-household interaction in travel mode choice: effects of contextual and situational factors

Chinh Q. Ho

Supervisor: Corinne Mulley
Associate supervisor: Rhonda Daniels

In transport research, the individual has traditionally been assumed to be the decision-making unit. Consequently, research has focused on the individual even if individual behaviour is contingent on interaction between household members. Household interaction can be observed not only in daily travel-activity patterns such as activity participation and the allocation of household resources and tasks, but also in long-term decisions of residential location choice and vehicle ownership. In the context of household decision and travel mode choice, this study aims to investigate the extent of household interaction influence and provides a micro-approach to the effects of land use factors on travel mode choice. The relevance of household context (such as life cycle, the number of vehicles vs. the number of licence holders) and choice situation (activity-travel patterns of other members, size of travel party) to household interaction is explored. In the context of household travel mode choice, two modelling approaches of Parallel Choice Constrained Logit and Latent Class models can be used to investigate intra-household interaction. This will be the first study to integrate household interaction and its relation to household context and choice situation with land use characteristics at a micro-level for the purposes of better informing relevant transport policies.

3. Linking choice models to the diffusion of electric vehicles in Australia
Asif Ahmed

Supervisor: Stephen Greaves
Associate supervisor: Geoffrey Clifton; Sean Puckett

Driven by sustainability objectives (oil dependence, reduced emissions), Australia, like many nations in the developed world, will soon introduce electric vehicles (EVs) into the consumer market. While EVs are seen by many as a promising solution for a long term real sustainable transport system, issues of capital costs, driving range, charging infrastructure, rising electricity prices and the source of electricity generation still plague the mass production and likely uptake of EVs. The crucial issues for the market penetration of this new technology are how fast and how many consumers will switch to the EVs. In the marketing literature, diffusion models have been developed to describe the growth in sales of new products. Choice theories have been widely applied to research in alternative fuel vehicles. Choice theory is mainly concerned with formulating choice probabilities, and it generally ignores demand dynamics. On the other hand, diffusion models rarely include control variables and individual choice input. This study focuses on incorporating diffusion effects and choice effects in an integrated model to capture simultaneously the diffusion and substitution process for electric vehicles.

4. Embedding Multiple Heuristics into Choice Models: An Exploratory Analysis
Waiyan Leong

Supervisor: David Hensher
Associate supervisor: John Rose

This presentation highlights some exploratory findings from an empirical study of embedding multiple heuristics into choice models. One of the heuristics tested is the so-called extremeness aversion heuristic which can be functionally represented by having respondents evaluate attribute values as gains relative to the worst attribute level in the local choice set. Embedding this heuristic into the model is shown to offer improvement in model fit over the standard linear-in-the-attributes and linear-in-the-parameters specification. Other heuristics, including the majority of confirming dimensions and reference point revision, are also found to contribute to the explanatory power of the model. An alternative approach to weighting multiple heuristics in a utility function by means of a logit-type specification for the probability weights is then introduced. The usefulness of this approach is empirically tested by conditioning the weighting function on socio-economic characteristics of the respondents.

5. Understanding the dynamics of travel behaviour changes from pseudo panels: evidence from Sydney Household Travel Survey data
Chi-Hong (Patrick) Tsai

Supervisor: Corinne Mulley
Associate supervisor: Rhonda Daniels

The travel behaviour literature identifies the employment of a pseudo-panel approach as an alternative methodology, in the absence of true panel data, to conduct a longitudinal study with a dynamic econometric model. However, there are some issues associated with a pseudo-panel analysis that have not been fully addressed when applying this approach to a travel behaviour change.

This presentation introduces the preliminary research work of my PhD thesis that first highlights the issues identified by the literature in pseudo-panel analysis as applied in travel behaviour studies. Two sets of pseudo panels are constructed from the Sydney Household Travel Survey, using data from 1997/98 to 2008/09. The validity of the created cohorts in terms of inter-cohort heterogeneity is first verified through an analysis of variance (ANOVA). The travel behaviour in terms of mode share and its relative factors: travel cost and person income also show transparent variation across cohorts from the constructed pseudo panels. The research results illustrate that a pseudo-panel analysis is an appropriate approach to investigate a longitudinal study of travel behaviour provided the pseudo panels are constructed through a valid process.

6. Reducing freight transport emissions: a review of mitigation policies

Richard Ellison

Supervisor: Stephen Greaves
Associate supervisor: David Hensher; Sean Puckett

The importance of freight transport to the economy means governments must balance its benefits with the costs it imposes on society. Amongst the most significant of these costs are its environmental costs in the form of emissions of air pollutants of direct harm to human health, and greenhouse gases. Policies for reducing freight transport emissions can be divided into four broad categories: voluntary and information-based policies, technology-based policies, regulatory policies and market-based policies. Voluntary and information-based policies provide information to firms on reducing their emissions, technology-based policies attempt to accelerate the adoption of newer, cleaner technologies, regulatory policies impose restrictions on emissions and the use of vehicles, and market-based policies use charging schemes to increase the direct costs of emissions. This review outlines the costs and benefits of policies in each of these categories and assesses the likely technological, political and economic barriers to their implementation.

7. Domination aspects in supply chains

Elizabeth Barber

Supervisor: David Walters
Associate supervisor: Ada Suk-Fung Ng

My doctorate covers a series of published papers. The theme of my doctorate focuses on strategies in supply chains and domination. The theory of domination in supply chains covers the supplier, manufacturer and retail centric domination areas. A recent expansion of domination centric power has been extended to distributors, especially distributors operating in global markets. Approximately twelve papers are now ready for submission in my thesis. The subject matter focuses on domination in supply chains and their strategic roles. The initial papers covered the performance of dominating players and how they shaped the overall performance of the total supply chain. The emphasis then developed into the creation of total supply chain value and continued to develop along this path by considering the strategies to implement to retain their dominance. Two case study papers have been presented to demonstrate dominance in supply chains; namely the iron ore and coal domestic transportation distributors in Australia.

8. Supply chain disruption costs study in containerized maritime transport chain

Zeyan Zhang

Supervisor: David Hensher
Associate supervisor: John Rose

This research presents the results of a microanalysis of freight transport choice decisions in a containerized maritime transport chain context. Current research has tended to concentrate on shippers' transport mode choice and port selection. In the context of a globalized market however, the behaviour of maritime containerized shippers has to be viewed as a complex decision and an integral element of the supply chain management strategy. Discrete choice modelling is applied to identify the key service attributes and its preference heterogeneity in maritime transportation, and to estimate the marginal values for the quality of maritime transport service. This thesis also aims to reveal what transport attributes are more important to improve during a transport disruption, and what supply chain characteristics affect shippers' choice in such situations. In doing so, we are able to gain an understanding as to where and how much should be invested in order to facilitate recovery in the case of a disruption based on the view of maritime participants' perspective. The research results confirm that freight rate, transit time, reliability, damage rate and frequency are the key service attributes influencing shippers' transport choice, identify that different product, shipment, company and supply chain characteristics would impact on shippers' decision, and indicate that shippers' WTP for transport service attributes are different between normal operation and a disruption circumstance. This research for the first time quantifies the costs of supply chain disruption in containerized maritime transport context and provides a benchmark of investment in improving maritime security and transport service attributes under disruptions.

9. What have been brought to the negotiation table? First glance at the stated choice experiment data

Demi Chung

Supervisor: David Hensher
Associate supervisor: John Rose

This study examines the extent to which contracting parties would reach an agreement on a PPP tollroad project based on the project's risk profile. Data are collected through an online stated choice experiment. Stakeholders who have been directly engaging in PPP tollroads were invited to participate in the survey. The international significance of this study is enhanced by the coverage and diversity of the experience and knowledge of all participants involved. In a nutshell, their experience in PPP years (projects) runs the gamut of one to 46 (one to 120 projects). These participants brought to the study their project experience in six regions covering 33 countries. Further, the relevance of the study to a variety of fields in PPPs is strengthened by the diverse background of participants: there are 24 different roles represented, from primary decision maker to consultant who come from 14 different organisations including steering committee and commercial bank. Results of testing the transaction cost economics are discussed at the end.

10. Direct modelling of attribute attendance

Andrew Collins

Supervisors: David Hensher
Associate supervisor: John Rose

In recent years, there has been a growing recognition in the literature of the importance of handling differences across individuals in the attendance to the attributes of choice alternatives, due largely to a research program by Hensher and colleagues. For a variety of reasons, an attribute might effectively be ignored by an individual. Despite significant progress, existing methods are limited in various ways. Capturing self-reported information on attendance is in many cases not feasible, and is complicated by issues of reliability and endogeneity. The use of conditional parameter estimates relies on arbitrary thresholds. Constrained latent class models suffer from an explosion of parameters and confound non-attendance with preference heterogeneity. Finally, extant variable selection models rely on the Bayesian framework. This work presents a new approach. Grounded in the classical framework, the model does not require additional information or arbitrary thresholds, and parsimoniously estimates attendance patterns. Further, the model can accommodate both non-attendance to an attribute, and, conditional on attendance, preference heterogeneity according to any assumed distribution, as the model nests the panel mixed logit model. The model is applied to several studies, with results that are statistically significant and intuitively plausible. The ongoing research agenda is also outlined.

11. Consistently inconsistent: the role of certainty, acceptability and scale in automobile choice

Matthew J. Beck

Supervisor: John Rose
Associate supervisor: David Hensher

The way in which respondents behave in stated preference experiments is of interest to many practitioners in the field of choice modelling. This paper draws together three increasingly prevalent concepts in the literature; the role of scale; choice certainty calibration as a method for reducing hypothetical bias; and the acceptability of alternatives as a method for better representing respondent choice behaviour. Using a scaled multinomial logit model to focus on the role of scale, it is found that the amount of idiosyncratic error in the context of automobile choice is significant. Choice task certainty is found to be a function of several respondent characteristics and can be used to decompose scale. In doing so, it is found that for choice tasks where there is less certainty about the choices made, the scale parameter is lower and hence these choices are more stochastic, particularly in the case of reduced alternatives. In comparing different approaches to incorporating certainty, it is found that parameter estimates differ substantially depending on what method is employed. The implications of a lack of a theoretical framework with respect to choice certainty are discussed, as are the implications of removing unacceptable alternatives from the modelling process.

12. Valuing travel time variability within the attribute-specific extended expected utility theory model and rank-dependent utility theory model
Zheng Li

Supervisor: David Hensher
Associate supervisor: John Rose

An attribute-specific Extended Expected Utility Theory (EEUT) model and an attribute-specific Extended Rank-Dependent Utility Theory (ERDUT) model are developed to better understand travel choice and behaviour in the presence of travel time variability (i.e., random variations in travel time, which lead to a travel time distribution for a repeated trip). By empirically addressing risk attitudes, the EEUT model delivers a better statistical fit and significantly lower mean estimates of values of travel time savings and variability than the traditional model under risk neutrality, using the same stated choice data set for a tollroad project. This evidence carries substantial merit given that the demand for this tollroad was overpredicted. The ERDUT model allows for a systematic treatment of three key components of decision making - preferences, risk attitudes and beliefs. Unobserved between-individual heterogeneity in preferences, risk attitudes and beliefs is also revealed, which is the first in the literature to my knowledge. Another significant and original contribution is the valuation of expected travel time savings (VETTS) which takes into account the travel time distribution (times and probabilities); and links the willingness to pay value with the source of utility (i.e., the travel time distribution).

13. A real-time decision making policy for container vessel slot allocation in global empty container repositioning
Montathip Chanpum

Supervisor: David Walters
Associate supervisor: Ada Suk-Fung Ng

The research is based on the global trade situation whereby each trade zone in the world market has different level of imports and exports which result in the accumulation of empty containers in some areas and insufficient supply in some other areas. The decision making policy to meet customer demands is subject to constraints of vessel capacity, the quantity of laden containers, and the number of empty containers which are available at the time the vessel arrives at the port. To allocate vessel slots to transport both laden and empty containers, this research aims to find the optimal solutions for loading or unloading activities performed when the vessel arrives at or departs from a particular port, and minimise the total expected cost at the holistic level within the given time interval.

14. Management of supply chain networks for diverse market requirements
Yujie Cai

Supervisor: David Walters
Associate supervisor: Ada Suk-Fung Ng

Many organisations employ multiple supply chains in an attempt to serve different market segments, which while providing a number of benefits, gives rise to challenges and problems. The research project seeks to contribute to the understanding of the phenomenon and more generally to the anatomy of the supply chain network using a qualitative method. At this stage, literature and real world examples are studied to explore why and how

companies rely on multiple supply chains. The research reaches the conclusions that even though challenging, multiple supply chains could be beneficial. While a dedicated-supply chain for each product/service offering is possible, literature suggests that different supply chains often end up with considerable overlap. The supply chain network needs to be well designed to coordinate the overlap and distinction of processes along the supply chains.

15. Improving road safety: an analysis of drivers' personal characteristics and objective driver behaviour

Adrian B. Ellison

Supervisor: Stephen Greaves
Associate supervisor: Rhonda Daniels

Road safety continues to be an important issue with road crashes among the leading causes of death globally accounting for 1.2 million fatalities and 50 million injuries each year. Given the significant contribution of human factors to these casualty figures, an improved understanding of drivers' behaviour is an important element in any road safety strategy. To date, most research has relied on driver surveys, simulator driving and police/hospital records however this ignores the significant variability within as well as between drivers. Within this context, this research aims to contribute to our understanding of the link between objective driver behaviour and drivers' attitudes, and understanding and perceptions of risk. As a first step, this research explores the in-vehicle driving behaviour of drivers at various levels of spatial and temporal aggregation.

16. How do businesses react to removal of car parking? -Insight from focus groups of local government staff

Claudine Moutou

Supervisor: Stephen Greaves
Associate supervisor: Corinne Mulley

Business owners in local town centres are a group of stakeholders with interests in the local transport access of their centre. Transport accessibility is an inherent competitive advantage for attracting customers (Warnaby et al 2005). When car parking is removed and/or when infrastructure is added to support more walking, cycling and public transport use, the transport access changes. The change can be interpreted as either a threat to the business or a source of new competitive opportunities (Still and Simmonds 2000; Marsden 2006). It is hypothesised that how a business owner interprets the change has an impact on the actions and outcomes they can expect to gain.

This presentation reports on focus groups held with staff of three metropolitan Councils who have insight on how business owners react to sustainable transport projects that involve changes to car parking. It will include a synopsis of businesses and their views on transport access features and then report on how business goals are perceived to be affected by transport access changes. The presentation concludes with commentary on the value and limitations of the focus groups to observe business owner actions and their mobilisation of resources.

17. Hypothetical bias in stated choice experiments: is it a problem? And if so, how do we deal with it?

Simon Fifer

Supervisor: Stephen Greaves
Associate supervisor: John Rose

The extent to which stated choice (SC) experiments suffer from hypothetical bias continues to be a controversial topic in the choice modelling literature. This thesis provides further evidence to this debate by examining the existence of hypothetical bias in a transport related SC experiment. Furthermore, the extent to which mitigation techniques can aid in reducing any associated bias with these models is also explored.

Data for this thesis were sourced from The University of Sydney study exploring the effect of exposure-based charging on motorist behaviour. This study is uniquely structured to allow for a comparison of SC and RP data from the same sample for the direct purpose of investigating hypothetical bias. Marginal Willingness to Pay (MWTP) estimates for distance (i.e., the WTP for an extra kilometre of travel), Total Willingness to Pay (TWTP) and model predictions with and without the applied mitigation techniques for each participant are compared to the actual WTP outcomes from the RP field study. Initial findings indicate that the SC model estimates are highly prone to hypothetical bias and that the mitigation techniques have potential to compensate for this inherent bias.